

A POPULATIONAL STUDY OF THE
EXOMORPHIC VARIATIONS IN *VICIA*
MINUTIFLORA DIETR. INCLUDING
V. REVERCHONII WATS. (LEGUMINOSAE)

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The taxonomic status of *Vicia reverchonii* Wats. has been in question for some time. It has been regarded both as a distinct species (Hermann, 1960) and as a form of *V. minutiflora* Dietr. (Shinners, 1948).

Vicia reverchonii was first collected in sandy soils of Dallas, Texas by Julien Reverchon in 1877. It was named and described by Sereno Watson in 1879 (GH). It was collected again in 1940 by William McCart, one mile south of Denton County, Texas. And it has been mentioned that it was collected in Wewoka, Oklahoma (Hermann, 1960) but there's no verification in herbarium records or in the field that it indeed had been collected there.

Shinners (1948) designated *V. reverchonii* as a form of *V. minutiflora* (*V. minutiflora* f. *reverchonii* (S. Wats.) Shinners). Turner (1959) agreed with Shinners' determination and published it as such in *The Legumes of Texas*. Hermann (1960), however, differentiated between *V. minutiflora* and *V. reverchonii* by legume and calyx pubescence, peduncle length, and calyx lobe length and shape. Correll and Johnston (1970) adopted Hermann's treatment as a distinct species. Shelter and Skag (1978) and Kartesz and Kartesz (1980) both regarded *V. reverchonii* as a synonym of *V. minutiflora*.

Flowers from herbarium specimens of *V. minutiflora* were observed to possess glabrous to densely pilose ovaries (Mahler, 1977, annotated 23 specimens as *V. reverchonii*, based on pubescent ovaries, out of 55 sheets previously labeled *V. minutiflora*). Also, the calyx, corolla, and shape and texture of the pods were thought to be typical of *V. minutiflora* (Shinners, 1948). Considering the morphological overlap, a study was initiated:

- 1) to determine the amount of variation in pubescence of ovaries and mature legumes of *V. minutiflora*, as well as the amount of variation in the other key characteristics;
- 2) to determine if *V. reverchonii* fits into the normal range of variation of *V. minutiflora*;
- 3) to determine if there was an ecological mechanism for the variation.

METHODS AND MATERIALS

Fifteen counties in north central Texas and eight counties in south central Oklahoma were investigated to locate populations of *V. minutiflora* and *V. reverchonii*. Twenty populations of *V. minutiflora* were located; however, none of the previously reported populations of *V. reverchonii* was located. See Figure 1.

Random collections were made at each site during March, April and May 1981. Specimens varied from flowering only, to flowering and fruiting, to fruiting only. Morphological characteristics were measured from 100 of these specimens and from 22 SMU herbarium specimens.

Ten key characteristics used to delimit the taxa (Hermann, 1960; Gunn, 1968) were studied. A comparison of the two species as found in Hermann (1960) and Gunn (1968) is found in Table 1.

The ten morphological characters examined on each specimen are listed in Table 2 along with the measurements used. For each character under investigation, five different measurements were randomly made on each plant specimen. This enabled me to see the variation of these characters, not only within the populations, but also on a given plant. A scale of ovary and legume pubescence was devised for the assessment of degree of pubescence: 1—Glabrous, 2—Scarce, 3—Moderate, 4—Abundant. See Figure 2 for relative pubescence.

Pollen grains were studied for taxonomically significant differences. Flowers were removed from specimens and acetolyzed as described in Erdtman (1960). Only one specimen of *V. reverchonii* (McCart 1989) was used for examination, while nine specimens of *V. minutiflora* was studied.

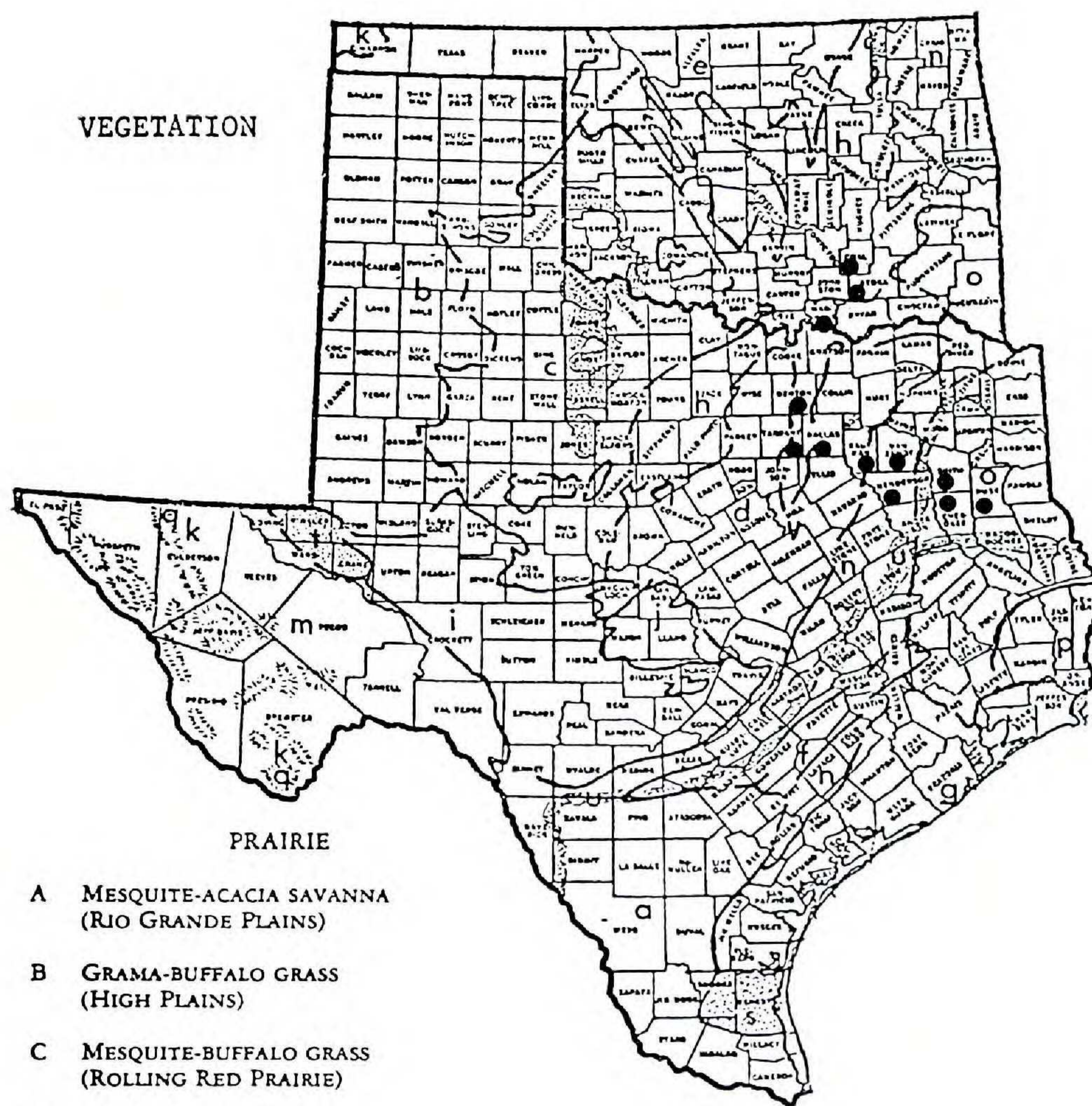
The herbarium specimens of *V. reverchonii* and *V. minutiflora* examined for variation and the specimens collected in the field for this study are on file at SMU.

RESULTS AND DISCUSSIONS

Figure 3 exhibits the ranges for the ten characteristics observed on *V. minutiflora* and *V. reverchonii* specimens. Although these data are from 120 specimens of the former and only 2 of the latter, in most cases, the characteristics used by Hermann (1960) to delimit *V. reverchonii* still fall within the extent of variation found in the mass collection of *V. minutiflora*. Therefore Hermann's diagnostic ranges are also included in Figure 3.

The number of leaflets per leaf varied on *V. minutiflora* from 4 to 9 and on *V. reverchonii* from 4 to 6. These data contradict Hermann's (1960) findings. Hermann's range for *V. minutiflora* was 4 to 6 leaflets; for *V. reverchonii*, (4) 6 to 10. There appears to be a definite overlap in the range of variation for the number of leaflets per leaf.

Figure 1. Counties in Texas and Oklahoma within which 20 populations of *V. minutiflora* were studied.



- PRAIRIE**
- A MESQUITE-ACACIA SAVANNA (RIO GRANDE PLAINS)
 - B GRAMA-BUFFALO GRASS (HIGH PLAINS)
 - C MESQUITE-BUFFALO GRASS (ROLLING RED PRAIRIE)
 - D BLUESTEM-NEEDLEGRASS (BLACKLAND PRAIRIE)
 - E BLUESTEM-GRAMA GRASS (NORTH CENTRAL OKLAHOMA)
 - F BLUESTEM-BUFFALO GRASS (FAYETTE PRAIRIE)
 - G BLUESTEM-SACAHUISTA (GULF COASTAL PRAIRIE)

- WOODLAND**
- H OAK-BLUESTEM (E & W CROSS TIMBERS-TEXAS; CROSS TIMBERS-OKLAHOMA)
 - I JUNIPER-OAK SAVANNA (EDWARDS PLATEAU)
 - J MESQUITE-OAK SAVANNA (LLANO BASIN)
 - K PINYON-JUNIPER (BLACK MESA & TRANS-PECOS MTNS.)
 - M CREOSOTE BUSH-SHRUB (TRANS-PECOS BASINS)

- FORESTS**
- N OAK-HICKORY (E TEXAS & NE OKLAHOMA)
 - O OAK-HICKORY-PINE (E TEXAS & SE OKLAHOMA)
 - P BEECH-MAGNOLIA-PINE-OAK-SWEET GUM (BIG THICKET)
 - Q PINE-DOUGLAS FIR (TRANS-PECOS MTNS.)
- DEEP SAND**
- R SHINNERY (N TEXAS & SW OKLAHOMA)
 - S MESQUITE-LIVE OAK SAVANNA (RIO GRANDE PLAINS)
 - T SAND DUNES (S HIGH PLAINS)
 - U CARRIZO, SPARTA, & QUEEN CITY SANDS

TABLE 1. Comparison of Key Characteristics

	<i>Vicia minutiflora</i>	<i>Vicia reverchonii</i>
* Leaflets per leaf	4-6	(4) 6-10
* Leaflet Width		3-7 mm
* Leaflet Length (including lower leaves)	5-35 mm	5-17 mm
* Calyx Lobe Length	0.5-1 mm	2 mm
* Calyx Lobe Shape	Deltoid	Lanceolate
* Calyx Tube Pubescence	Sparsely villous	Villous
* Peduncles in Fruit	2 cm	3 cm
* Legume Pubescence	Glabrous	Appressed villous
† Ovule Number	4-8-12	11-12-13
† Standard Length	4-6-8	5-6-7

* from Hermann, 1960
† from Gunn, 1968

TABLE 2. Characters Examined on Herbarium and Mass Collection Specimens

<i>Morphological Characters</i>	<i>Means of Measurement</i>
Leaves:	
1. Leaflets per Leaf	Number
2. Leaflet Width	Mm
3. Leaflet Length	Mm
Flowers and Fruits:	
4. Calyx Lobe Length	Mm
5. Calyx Lobe Shape	Deltoid or lanceolate
6. Peduncle Length in Fruit	Mm
7. Legume Pubescence	see Figure 2
8. Ovary Pubescence	see Figure 2
9. Ovule Number	Number
10. Standard Length	Mm

The leaflet width for *V. minutiflora* exhibited a range from 0.5 mm to 5 mm. A range of 2.5 mm to 4 mm was observed for *V. reverchonii*. Again this coincides. If one considers Hermann's range of leaflet width for *V. reverchonii* (3 mm to 7 mm), it would be clear that this overlaps the upper portion of the range found for *V. minutiflora*.

The leaflet length for *V. minutiflora* varied from 6 mm to 36 mm and for *V. reverchonii* from 8 mm to 15 mm. Overlapping of the ranges for leaflet length is shown in these data, as well as in Hermann's data. Hermann's range for *V. minutiflora* (including the lower leaves) was 5 mm to 35 mm and for *V. reverchonii* was 5 mm to 17 mm.

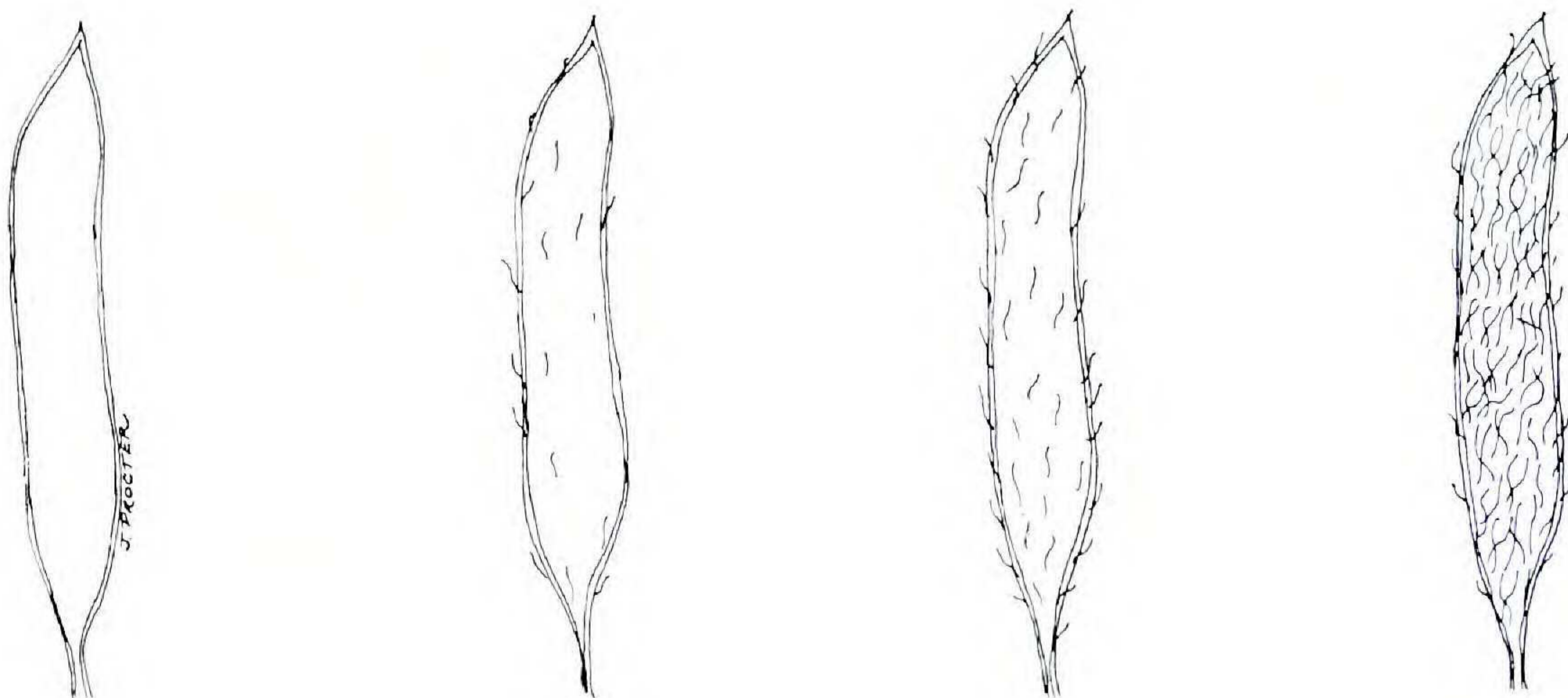


Figure 2. Scale of legume and ovary pubescence: 1) glabrous, 2) scarce, 3) moderate, 4) abundant.

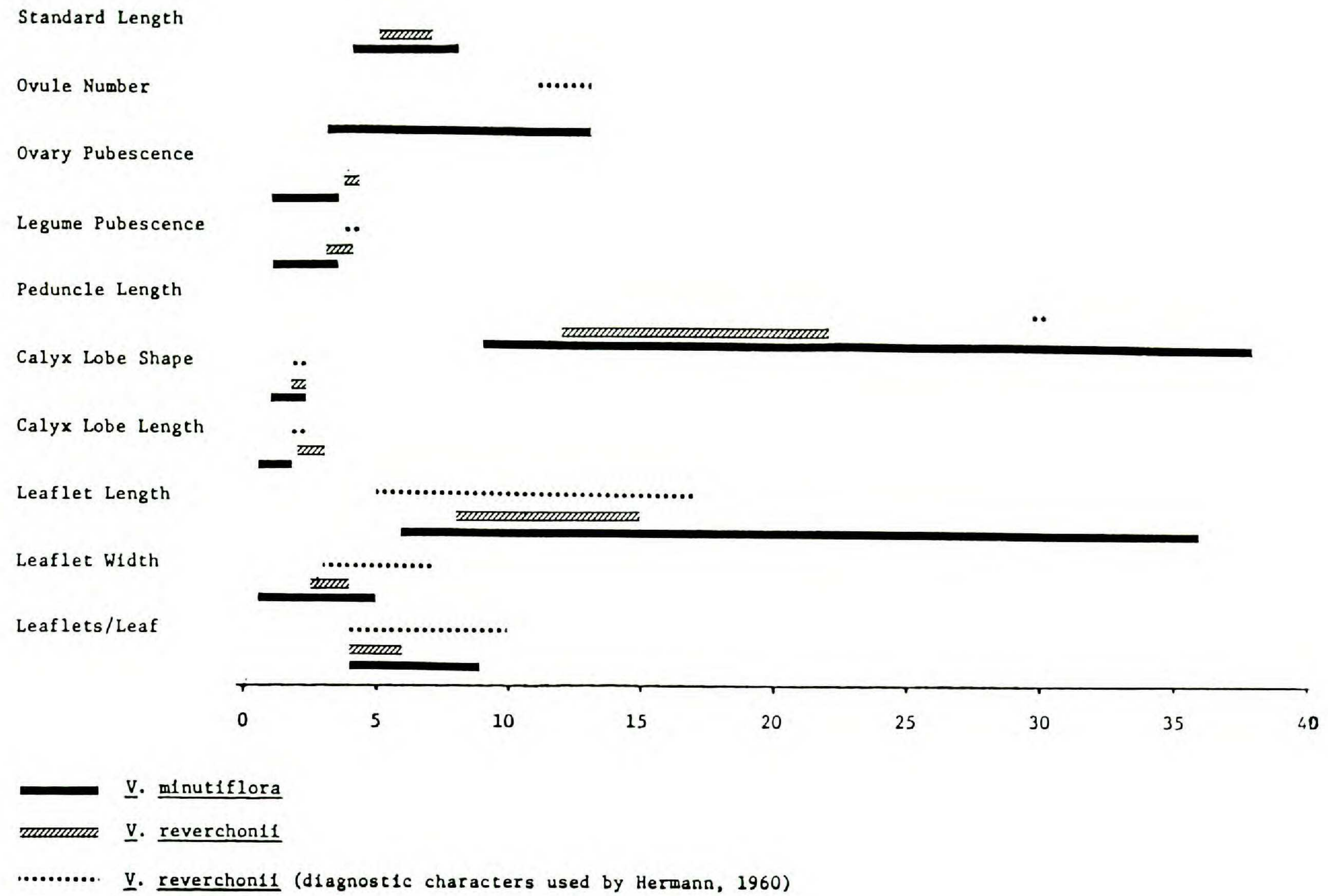
The calyx lobe length was measured and a range of 0.5 mm to 1.8 mm was obtained for *V. minutiflora*. *Vicia reverchonii* specimens displayed a range of 2 mm to 3 mm. This was one of the two characteristics which demonstrated no overlapping between the taxa. However, the calyx lobe shape did exhibit an overlap. In fact, there were many *V. minutiflora* specimens with both deltoid and lanceolate lobes on the same calyx. In Figure 2, lanceolate lobes were designated as 1 and deltoid lobes as 2. The *V. reverchonii* specimens showed no range between lanceolate and deltoid.

Examination of the peduncle length in fruit shows a range of variation for *V. minutiflora* of 9 mm to 38 mm, which included the range obtained for *V. reverchonii* (12 to 22 mm).

The variation in legume pubescence showed some overlap, with *V. minutiflora* measuring glabrous to moderately abundant (1–3.5 on Figure 2) and *V. reverchonii* measuring moderate to abundant (3–4 on Figure 2). It was found that the pubescence varied not only from plant to plant within the populations but also on a given plant.

The ovary pubescence showed no overlap. *Vicia minutiflora* exhibited a range from glabrous to moderately abundant (1–3.5 on Figure 2). *Vicia reverchonii* exhibited an abundant pubescence (4 on Figure 2). It was observed that there was a general trend from hairy ovaries to less hairy legumes in *V. minutiflora*. An attempt was made to find a correlation between pubescence and aridity of the habitat or pubescence and east-west vegetational zones. Unfortunately, no correlations could be made from the data at this point, but that does not preclude the possibility of correlations.

Figure 3. Range of each characteristic examined.



The ovule number for *V. minutiflora* varied from 3–13. Although no ovule number was determined from the *V. reverchonii* specimens which were examined, Gunn (1968) indicated the ovule number to be 11–12–13, which falls within the range obtained for *V. minutiflora*.

Gunn (1968) determined the standard length for *V. minutiflora* to be 4 mm to 8 mm and for *V. reverchonii* to be 5 mm to 7 mm. Gunn's data are in agreement with the ranges found for this study. *Vicia reverchonii* falls well within the range of variation of *V. minutiflora*.

From the above data eight of the ten characteristics of *V. reverchonii* were found to fall well within the ranges of variation for *V. minutiflora*. Those which didn't fall within the ranges were close enough essentially to be considered on the extremes of the ranges. For example, calyx lobe length on *V. minutiflora* was 0.5–1.8 mm whereas on the *V. reverchonii* specimens it was found to be 2–3 mm. The ovary pubescence on *V. minutiflora* had a range of 1–3.5 and measured 4 on *V. reverchonii* specimens. In both cases the values found on the *V. reverchonii* specimens appear to be an extension of the calyx lobe length range and the ovary pubescence range.

From the study conducted the majority of the population was found to have pubescence on the ovaries and on the mature pods. The extremes of this range of pubescence are glabrous and densely pubescent. If one were to regard *V. reverchonii* as a distinct form because of its dense pubescence then there should be 2 other forms designated for the other variations of pubescence—a less pubescent form and a glabrous form.

Therefore the above data indicate that *V. reverchonii* is not a distinct species and should be recognized as one extreme within the variation of *V. minutiflora*.

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